FIN4718 FinTech Management

Semester 1, AY2025-2026 – Course Syllabus

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Course Description: Fintech continues to be a very popular focus within financial markets in the age of technology. Long protected by regulatory environments, financial institutions are coming under challenge from powerful technology providers who are able to deliver at greater efficiency and lower costs. This trend has forced FIs to embrace technology like never before. The common myth and perception is that this wave of technology will redefine society and career paths. And it is important to understand how the future of FIs and disruptors will likely evolve and the implications for financial disintermediation.

This module is targeted towards BBA (although possibly also BACC) students in the NUS Business School, and focuses on technology impact (both as enablers and disrupters) on businesses, rather than on the technological change itself.

The influence of technology in the fields of finance, accounting, banking, insurance, wealth, pensions are far reaching and its sphere of influence is likely to continue. With the onset of 5G and quantum computing, digital assets investing, better algorithms in data science and big data, artificial intelligence and machine learning, the prospects of how fintech will evolve looks both exciting and challenging. It affects how institutions, society and agents interact, transact and engage. The amount of investments that have been channeled into fintech development has accelerated beyond expectations.

Ranging from Blackrock using robo-analysts for research and investments to how crypto exchanges trade crypto currencies and beyond, the implications and applications are far reaching in terms of scope and impact. Retirement planning will be made easier, safer and more transparent. Financial transactions will be more secure and versatile. Risks and information will be processed at greater frequencies and spectrums. Costs will be reduced and quality likely be improved. This is the promise of fintech.

The US and China are leading the way in fintech and its entourage. Singapore, Hong Kong, London, Tel-Aviv are also forging great efforts to catchup with new business models that integrate fintech in their capital markets and institutions which operate within that eco-system. Underbanked emerging countries are using fintech to penetrate the masses while overbanked developed markets use fintech to provide better solutions to traditional banking.

And central banks and regulators are forced to better understand ways in which the world of fintech is affecting their modus operandi and policy implications. Not only how conventional policy tools measure up in the new world of fintech but also new thinking on ethical and governance standards needed to ensure the well-functioning of new technologies.

TOPICS

0. **Introduction to Fintech**
    - FinTech vs TechFin
1. **Encoding, Integrity, Confidentiality, Identity Numeral Systems, Cryptography & Encryption**
    - Numeral Systems & Hashing Functions
    - Cryptography, Encryption, & Digital Signatures
2. **Blockchain 1: Bitcoin, Mining, DLT**
    - Consensus Protocols, Mining, and the process of Blockchain
    - Nodes and Byzantine Attacks
3. **Blockchain 2: Ethereum, Staking, D'Apps**
    - Ethereum and Staking
    - Smart Contracts & Oracles
4. **Blockchain 3: Decentralized Finance**
    - DeFI applications
    - MakerDAO
5. **Data Science & Artificial Intelligence**
    - Economics and Management of Data
    - Computer Science vs Economics and Financial Modelling Paradigms
    - **MID-TERM QUIZ** (8th Sep Class period) – subject to change
6. **AI and ML Methodologies I**
    - Supervised Learning
    - Semi-Supervised Learning
7. **AI and ML Methodologies II**
    - Semi-Supervised Learning
    - Unsupervised Learning
8. **Deep Learning: Neural Networks**
    - Deep Learning, Feedforward & Back Propagation Networks
    - Artificial Neural Networks/Recurrent Neural Networks/Convolutional Networks
9. **Natural Language Processing**
    - Natural Language Processing vs Natural Language Generation
    - Word Embeddings, Word Vectors, n-gram and Language Modelling
10. **Large Language Models**
    - LLMs and Transformers
    - Linear Transformation and Attention
11. **Fintech in Banking**
    - Payment Systems & Credit analysis
    - Wealth Management and Robo Advisors
12. **Fintech in Investment Management, Trading, Insurance**
    - Market Microstructure and Investment Management
    - Algos in Asset Allocation, Trading, and Execution Strategies
    - Economics of Insurance
13. **Project Presentation**
    - **FINAL QUIZ** (10th Nov Class period)
    - **Project Presentation**

Reading Materials (Optional)

- **The Fintech Book:** The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries – Susanne Christi/Janos Barberis (Wiley, 2016)
- **The WealthTech Book**: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries – Susanne Christi/Thomas Puschmann (Wiley, 2018)

Learning Outcomes

The objective of this module is to give participants a comprehensive introduction to key aspects of FinTech paradigm and practice. Starting from theory and concepts, students will be taught the ongoing developments in the field and how they can integrate paradigms into practice and how practice drives paradigms.

The course will integrate various categories of fintech development areas into a core wealth and investment platform which will be used as a framework for project work. For example, how do we build an effective Anti-Money Laundering (AML) prototype into a wealth management platform. How can one develop a risk monitoring and management capability component into the core platform that can effectively estimate value at risk or stress scenarios. The varied nature of the project is designed to stimulate either the entrepreneurship spirit or the technological aspirations of the student.

The course is targeted at students looking to pursue and enhance their careers in the financial, banking and insurance sectors by enlarging his knowledge base and skill set. The outcomes are outlined below:

- Better prepared to enter into financial institutions ready to contribute to current industry developments
- Have a better understanding of what it takes to be a technology entrepreneur in the field of finance.
- Be able to engage in hands-on greenfield fintech projects

Students are expected to:

1. Participate fully in class discussions and complete the pre-reading for each weekly session
2. Develop an entrepreneurial and disruptive mindset when looking at existing business practices in the financial services industry
3. Work diligently and collaboratively within their group for the FinTech project
4. Read extensively in relation to current trends and new developments in the FinTech sector

NUS **Recess Week**: 21 – 28 September 2025

Quiz 1 date: 8th September

Quiz 2 date: 10th November

Grading:

Quantity	Type	Points
1	Mid Term Quiz (TBA – in class)	20
1	Final Quiz (TBA – in class)	30
1	Fintech Project & Exercise	40
1	Class Participation	10
	TOTAL	100

APPENDIX A

Schedule

Ses	Topic	Readings
0	Fintech: An Introduction Self Read	1) The Fintech Book, Chap 1&2 2) "FinTech and RegTech in a Nutshell, and the Future in a Sandbox, Research Foundation 3) "Fintech and Financial Services", IMF 4) "The Emergence of the Global Fintech Market: Economic and Technological Determinants", CESifo
1	Numeral Systems, Security & Integrity: Hashing, Encryption & Signatures	5) The Science of Encryption – Prime Numbers and mod *n* Arithmetic – UC Berkeley
2	Blockchain 1: Bitcoin – Mining - Cryptos	6) "An Introduction to Blockchain", U Virginia Case 7) "The essence of the blockchain", Scott 8) "The Blockchain Revolution: Analysis or Regulation and Technology Related to DLT", Kakavand et.al. 9) https://cointelegraph.com/bitcoin-for-beginners/how-blockchain-technology-works-guide-for-beginners#hash-function 10) What Blockchain Can't Do - HBR - 2018
3	Blockchain 2: Ethereum – Staking - DApps	11) "Smart Contracts – White Paper", Softjourn 12) "Coin Operated Capitalism", U Penn Law 13) LIBRA - Global Challenger in payments and for Central Banks - DB 14) "Cryptocurrencies: Beyond the Hype", BIS Papers 15) "Crypto technology: A solution still seeking a problem", Barclays
4	Blockchain 3: DEFI – Decentralized Finance	16) "DEFI Beyond the Hype: The Emerging World of Decentralized Finance", Wharton
5	Data Science and AI	17) "Big Data and AI Strategies for Investing", JPMorgan 18) "The Netflix Recommender System- Algorithms, Business Value, and Innovation", NETFLIX
6	AI and Machine Learning I	19) "A Very Brief History of Artificial Intelligence", B Buchanan 20) "Artificial Intelligence", M Minsky
7	AI and Machine Learning II	21) "When will AI Exceed Human Performance?" Oxford 22) "Artificial Intelligence and Life in 2030" Stanford 100 yr Study on AI
8	Deep Learnings: Neural Networks – ANN, RNN, LSTMs	23) https://towardsdatascience.com/a-gentle-introduction-to-neural-networks-series-part-1-2b90b87795bc
9	Natural Language Processing – NLP and NLG	24) "Natural language processing: an introduction", Nadkarni et.al.
10	LLMs & Transformers	
11	Fintech in Banking	25) The Fintech Book, Chap 10 26) "Rise of the Fintechs: Credit Scoring Using Digital Footprints", FMC
12	Fintech in Investment & Insurance	27) "Fintech in Investment Management", CFA Readings 28) "Blackrock Robo-Advisor 4.0 - When AI replaces Human Discretion" 29) "Alternative Data, Machine Learning & Artificial Intelligence Developments in 2019" – JPM

		30) "Handbook of AI and Big Data in Investments" Foreword Research Foundation 2023 31) The Fintech Book, Chap 5 32) Insuretech 10 - Trends for 2019 - KPMG - 2019
13	Class Project Presentations FINAL QUIZ	• Class Presentations

ACADEMIC HONESTY & PLAGIARISM

Academic integrity and honesty is essential for the pursuit and acquisition of knowledge. The University and School expect every student to uphold academic integrity & honesty at all times. Academic dishonesty is any misrepresentation with the intent to deceive, or failure to acknowledge the source, or falsification of information, or inaccuracy of statements, or cheating at examinations/tests, or inappropriate use of resources.

Plagiarism is 'the practice of taking someone else's work or ideas and passing them off as one's own' (The New Oxford Dictionary of English). The University and School will not condone plagiarism. Students should adopt this rule - You have the obligation to make clear to the assessor which is your own work, and which is the work of others. Otherwise, your assessor is entitled to assume that everything being presented for assessment is being presented as entirely your own work. This is a minimum standard. **In case of any doubts, you should consult your instructor.**

Additional guidance is available at:

http://www.nus.edu.sg/registrar/adminpolicy/acceptance.html#NUSCodeofStudentConduct

Online Module on Plagiarism:

http://emodule.nus.edu.sg/ac/